The Office of Environment, Safety and Health and its Office of Nuclear and Facility Safety (NFS) publishes the Operating Experience Weekly Summary to promote safety throughout the Department of Energy (DOE) complex by encouraging feedback of operating experience and encouraging the exchange of information among DOE nuclear facilities.

The Weekly Summary should be processed as an external source of lessons-learned information as described in DOE-STD-7501-96, *Development of DOE Lessons Learned Programs*.

To issue the Weekly Summary in a timely manner, the Office of Operating Experience Analysis and Feedback (OEAF) relies on preliminary information such as daily operations reports, notification reports, and, time permitting, conversations with cognizant facility or DOE field office staff. If you have additional pertinent information or identify inaccurate statements in the summary, please bring this to the attention of Jim Snell, 301-903-4094, or Internet address jim.snell@hq.doe.gov, so we may issue a correction.

*Readers are cautioned that review of the Weekly Summary should not be a substitute for a thorough review of the interim and final occurrence reports.*

# Operating Experience Weekly Summary 97-28

*July 4 through July 10, 1997*

Table of Contents



## Visit Our Web Site

The Weekly Summary is available, with word search capability, via the Internet at **http://tis.eh.doe.gov/web/oeaf/oe_weekly/oe_weekly.html**.
If you have difficulty accessing the Weekly Summary at this URL, please contact the ES&H Info Center, 1-800-473-4375 for assistance.

# *EVENTS*

## 1. NUCLEAR CRITICALITY SAFETY VIOLATIONS AT FERNALD

On July 1, 1997, at the Fernald Environmental Management Project, waste management contract personnel violated two nuclear criticality safety controls. The first violation occurred when they moved five drums and two containers of enriched restricted material without documented approval for the operation. The second violation occurred because the supervisor assigned to the project was not trained as a fissionable material handlers supervisor. Investigators have determined that these violations constitute being outside of the facility authorization basis. DOE has suspended nuclear material activities at the facility, and an operational readiness review of mass restricted enriched materials is required for restart. (ORPS Report OH-FN-FDF-FEMP-1997-0038)

On June 25, 1997, while performing a periodic walk-down of a fissile material control area, nuclear criticality safety representatives discovered containers which they believed to be inappropriately stored in the area. They initiated an investigation and determined the containers were moved to the area without a nuclear safety operational authorization. The facility implementation plan for safety analysis reports and technical safety requirements, including the nuclear facility basis for interim operations and safety documentation for nuclear criticality safety, requires this authorization. These documents specifically address administrative controls for activities involving fissile materials and require documented nuclear criticality safety approval for all activities involving fissile material. These documents also require that qualified fissile material handlers and supervisors conduct all fissile material movement and handling.

NFS reported similar criticality safety issues at Fernald in Weekly Summaries 97-06 and 97-07.

- On January 31, 1997, fissile material handlers violated plant procedures when they moved a drum containing enriched restricted material from one facility to another without approval. Investigators determined that the drum was one of several containing enriched restricted material moved to a repackaging facility. (ORPS Report OH-FN-FDF-FEMP-1997-0013)

- On January 16, 1997, a Fernald facility manager reported that the nuclear material mass limit was violated in a storage building categorized as non-nuclear. Workers moved slightly enriched uranium into the storage building because managers at the building did not know the storage limits specified in DOE-STD-1027-92, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23*, *Nuclear Safety Analysis Reports*. (ORPS Report OH-FN-FDF-FEMP-1997-0006)

Operating Experience Analysis and Feedback (OEAF) engineers reviewed the Occurrence Reporting and Processing System (ORPS) database for nuclear criticality safety events caused by procedures not used or used incorrectly and found 143 events. Figure 1-1 shows the distribution of the root causes reported by facility managers for these events DOE-wide from 1990 to present. Management problems represented 43 percent of the root causes, and personnel errors represented 40 percent. Further review of management problems shows that 39 percent were caused by inadequate administrative control; 48 percent of the personnel errors were caused by inattention to detail.

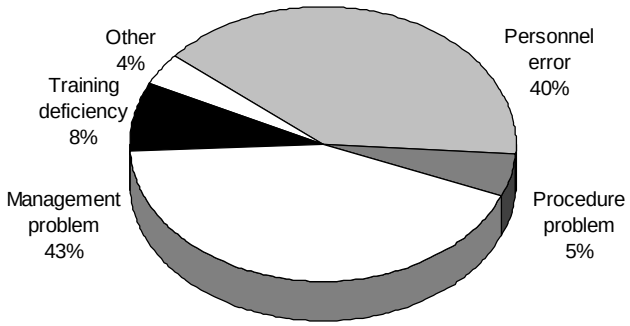


**Figure 1-1. Distribution of Root Causes of Nuclear Criticality Safety Events with the Direct Cause of Procedures Not Used or Used Incorrectly[1]**

These events are similar to issues discussed in a working group report for an assessment that was completed at Oak Ridge. That assessment concluded that some deficiencies are caused by the cultural resistance to change. DOE/EH-0525*, Highly Enriched Uranium Working Group Report, December 1996,* discusses similar issues at DOE facilities. DOE O 5480.24, *Nuclear Criticality Safety*, provides direction on establishing nuclear criticality safety program requirements. The Order invokes several American Nuclear Society Standards for basic elements and control parameters in programs for nuclear criticality safety. DOE O 5480.23, *Nuclear Safety Analysis Reports*, specifies operational controls to be included in an approved safety basis, including training and needed approvals.

On May 19, 1997, the Defense Nuclear Facilities Safety Board issued *Recommendation 97-2 to the Secretary of Energy, Pursuant to 42 U.S.C. 2286a(a)(5), Atomic Energy Act of 1954, As Amended.* This recommendation states: "it is important to maintain a good base of information for criticality control, covering the physical situations that will be encountered in handling and storing fissionable material in the future and to ensure retaining a community of individuals competent in practicing the [criticality] control."

**KEYWORDS:** drum, storage, criticality safety

**FUNCTIONAL AREAS:** Materials Handling/Storage, Nuclear/Criticality Safety

[1] OEAF engineers screened the ORPS database for Nature of Occurrence "01A" (nuclear criticality safety) and for Direct Cause "3B" (procedure not used or used incorrectly) DOE-wide and found 143 events from 1990 to July 8, 1997.

## 2. CRANE CONTACTS 13.8 kV LINE AT HANFORD

On July 2, 1997, at Hanford, rigging suspended from a crane contacted an energized 13.8-kV electrical distribution line at a construction site, causing a phase-to-ground fault and loss of power to several facilities. Investigators reported that the crane operator and an oiler were preparing the crane for operation and that the boom had been left positioned above the 13.8-kV line at the end of the previous day. While looking into the rising sun, the operator attempted to lower the rigging to his line of sight for inspection. As he did so, a 12-foot choker cable attached to the rigging contacted the 13.8-kV line, causing the fault. Improper operation of the crane in a prohibited zone resulted in the loss of power to several facilities and could have caused serious personal injury. (ORPS Report RL--PHMC-KBASINS-1997-0013)

Investigators reported that the Project Hanford Management Contractor suspended the operation of mobile cranes for the construction project until the contractor submits a corrective action plan. The event is still under investigation. However, it is expected that corrective actions will include designating the vertical area above and below energized electrical lines as part of a prohibited zone.

NFS reported events involving cranes in several Weekly Summaries in 1996 and 1997. Following are examples of some of the event reports.

- On May 30, 1997, at the Hanford Tank Farms, a 30-ton mobile, hydraulic crane tipped while lifting a trench box because the operator failed to extend all four outriggers as required.

- On February 24, 1997, at the Idaho National Engineering Laboratory Advanced Test Reactor, a crane operator moved a 49,000-pound experiment cask over the top of the reactor without reactor confinement, violating the technical specification limiting condition for operation.

- On October 9, 1996, at Oak Ridge, a 27.5-ton mobile, hydraulic crane lifting a mobile aerial manlift apparatus over a concrete wall tipped until the boom struck the wall.

- On March 29, 1996, at the Hanford Fast Flux Test Facility, a crane operator and rigging crew in the Maintenance and Storage Facility mis-read incremental divisions on a load cell and applied approximately 5,000 pounds of force to the load eyes of a fuel cask instead of the 1,500 pounds required by procedure.

DOE-STD-1090-96*, Hoisting and Rigging*, provides guidance for operation of cranes near electrical systems. This event could have been avoided if operators had followed the requirements for safe operation near energized electrical lines provided in Section 9.5.2 of the standard. In this case, the crane was operated within a boom-length of the power line. The standard requires maintaining at least 10 feet of clearance between the power lines and the crane, load line, and load when working near 13.8 kV lines. The standard also states that any operation over electric lines, even without a load, is extremely dangerous and should be avoided. In addition, a signaler must be in constant contact with the operator when equipment is in the prohibited zone. Figure 2-1 shows the prohibited zone and danger zone for cranes operated near electrical transmission lines. Managers at DOE facilities that use mobile cranes should review Section 9.5.2 of DOE-STD-1090-96 before allowing the operation of mobile cranes near energized power lines.

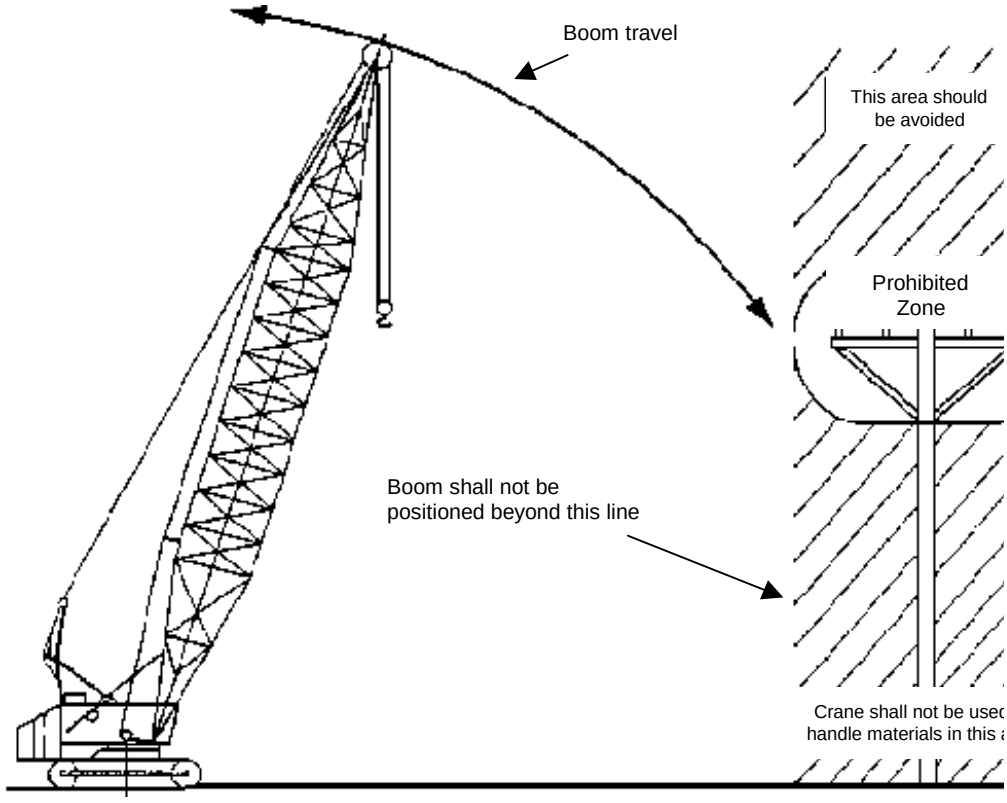


**Figure 2-1. Prohibited and Danger Zones for Cranes and Lifted Loads Operating Near Electrical Transmission Lines (Reprinted from DOE-STD-1090-96, *Hoisting and Rigging*)**

**KEYWORDS:** crane, electrical hazard

**FUNCTIONAL AREAS:** Hoisting and Rigging, Construction

## 3. CRANE "TWO-BLOCKED" AT HANFORD

On June 23, 1997, at the Hanford Fast Flux Test Facility, an operator "two-blocked" a crane and cracked a sheave on the hook block while removing a protective cover from an interim storage cask. "Two-blocking" occurs when the load block of a crane exceeds its upper limit of travel and comes into contact with the running block. Investigators reported that the crane operator lowered the boom of the crane to extend the block out over the protective cover. This lowered the height of the upper and hook blocks. The signaler motioned the operator to stop when he saw that the lift was getting too high, but the hook block contacted the upper block before the operator responded to the signal. The person-in-charge inspected the crane, but he did not notice the cracked sheave and allowed the
crane to continue operating. Continued use of the crane could have caused a load to drop, resulting in personal injury or substantial property damage. (ORPS Report RL--PHMC-FFTF-1997-0007)

Investigators determined that a safety interlock that should have stopped the lift before the blocks made contact failed because a cap on a fuse holder vibrated loose. They also determined that this had been an ongoing problem and that the operator had checked the interlock before the lift. The person-in-charge would normally have reported the event to his supervisor, but because the supervisor was on leave, he did not report the event to anyone. The person-in-charge inspected the lifting rig but found no apparent damage. They used the crane on several subsequent lifts, including casks weighing 15,000 pounds. Investigators determined that operators heard a noise during one of the lifts, re-inspected the crane, and found a 4-inch crack in the sheave that caused it to spread apart and rub against the block. The operator lowered the load to the ground, the rigger disconnected it from the crane, and the crane was removed from service.

Facility personnel are still investigating the event and have not determined the final corrective actions. It is expected that they will develop a detailed inspection and recertification plan before returning the crane to service.

The Office of Environment, Safety and Health reported a similar "two-blocking" incident in Volume 2, Number 11, of the *Occupational Safety Observer*. On June 23, 1993, an operator was using a crane with two lifting systems: a primary system for heavy loads and an auxiliary system for lighter loads. He was using the auxiliary system and winched the primary load block up near the top of the boom to keep it out of the way. While moving the load, the operator extended the boom. He slackened the auxiliary line to compensate, but failed to slacken the primary load line, creating the two-blocked condition. Figure 3-1 shows how this occurred.

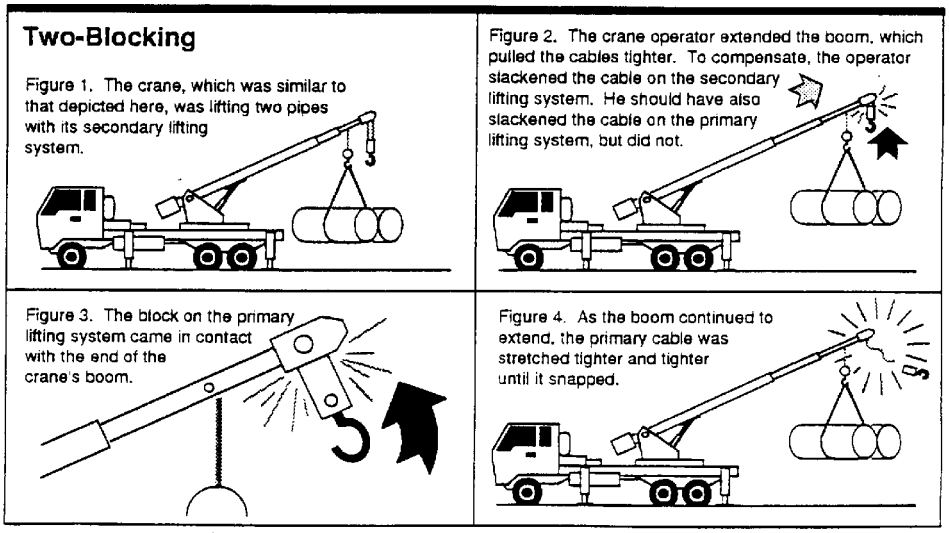


**Figure 3-1. Crane Two-Blocking**
**(Reprinted from *Occupational Safety Observer,* November 1993, Vol. 2, No. 11)**

Refer to article 2 on page 3 for another event involving a crane at Hanford. NFS also reported another problem with fuses in cranes at the Fast Flux Test Facility in Weekly Summary 97-17. On April 17, 1997, an electrician failed to replace fuses in two electrical panels for containment polar crane brakes, resulting in minor brake damage.

These events could have been avoided if the individuals involved had carried out the responsibilities delineated in DOE-STD-1090-96*, Hoisting and Rigging*. The standard states that the supervisor is responsible for ensuring that equipment is operated safely, for assigning a designated leader for each lift, and for designating a person-in-charge for critical lifts. The person-in-charge or designated leader is responsible for directing the lift and stopping the job when a potentially unsafe condition is recognized. The operator is responsible for safe operation of the equipment and should not operate equipment with a known safety problem. Personnel involved in crane operations should review their responsibilities as detailed in the standard.

**KEYWORDS:** crane, rigging

**FUNCTIONAL AREAS:** Hoisting and Rigging

## 4. AIR FILTER HOUSING FRAGMENTS RIP THROUGH EXPANDED ALUMINUM GUARD

On July 2, 1997, at the Los Alamos National Laboratory Printed Circuit Fabrication Facility, personnel reported that a plastic housing for a compressed-air-line filter had fragmented and ripped through the expanded aluminum guard. A technician discovered the problem when he entered the laboratory and heard the sound of air escaping. While investigating he saw fragments of the filter near a compressed air line. The technician determined that the hazard was minimal, entered the room, and isolated the system upstream of the filter. The filter was located near a work station that is occupied during normal working hours, and the fragments could have injured a person working there. (ORPS Report ALO-LA-LANL-FIRNGHELAB-1997-0006)

Investigators reported that the failure occurred on a housing for a Deltech Filter, Model 150, manufactured by Deltech Engineering. The 0.25-inch-thick polycarbonate filter housing was approximately 5 inches in diameter and 10 inches long. Investigators determined that the filter fragments were stress-cracked by the synthetic oil in the air lines. The filter housing has a rated pressure of 150 psi and was used for about 10 years to remove oil from the air in a line for some laminating presses. The system normally operates at pressures between 90 psi and 122 psi and is governed by set points.

Facility personnel shut down the system and technicians replaced all the filters with plastic housings with filters with metal housings.

Attachment 1 to DOE O 440.1, *Worker Protection Management for DOE Federal and Contractor Employees*, provides functional area requirements for worker protection. Section 6 includes guidance on the safe design of pressurized systems and states that all systems shall conform to the applicable American Society of Mechanical Engineers (ASME) standard and the strictest applicable state and local codes. For systems in pressure ranges where national consensus codes are not applicable, a level of protection comparable to the ASME standard shall be provided. Designs shall be reviewed by an independent design professional, systems shall be inspected by qualified personnel, and documentation shall be maintained.

Operating Experience Analysis and Feedback engineers recommend that cognizant facility personnel check for and replace Deltech Filters and other filters with plastic housings.

**KEYWORDS:** filter, air

**FUNCTIONAL AREAS:** Industrial Safety, Chemistry